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INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P018298WOP	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/GB 03/03938	International filing date (day/month/year) 10.09.2003	Priority date (day/month/year) 10.09.2002
International Patent Classification (IPC) or both national classification and IPC G06K19/06		
Applicant INGENIA HOLDINGS LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.



☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 7 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

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Date of submission of the demand 08.04.2004	Date of completion of this report 25.11.2004
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Schmidt, R Telephone No. +49 89 2399-2491 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB 03/03938

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-56 as originally filed

Claims, Numbers

1-64 received on 17.11.2004 with letter of 15.11.2004

Drawings, Sheets

1/23-23/23 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b));
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-64
	No: Claims	
Inventive step (IS)	Yes: Claims	1-64
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-64
	No: Claims	

2. Citations and explanations

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB 03/03938

Re Item V.

1. Reference is made to the following document:

D1: US-A-5 268 043

Document D1 was not cited in the international search report. A copy of said document has already been provided to the Applicant.

2. Regarding the subject-matter of claim 1, document D1 discloses a security device comprising at least one magnetic element (12), wherein said magnetic element is responsive to an applied magnetic field to provide a characteristic response (cf. column 5, line 45 - column 6, line 18).

Since the available documents do neither disclose nor suggest to make said magnetic element from a material that comprises structural defects that cause brittle mode switching in which the magnetic growth of a single magnetic domain dominates the change in magnetisation of a respective magnetic element, the subject-matter of claim 1 meets the requirements of Article 33(2) and (3) PCT.

- 2.1 The same applies for independent claims 20, 33, and 48 since they contain corresponding features related to brittle mode switching characteristics.

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CLAIMS

1. A security device comprising at least one magnetic element, wherein said at least one magnetic element is responsive to an applied magnetic field to provide a characteristic response.
- 5 2. The security device of Claim 1, wherein said at least one magnetic element is supported by a substrate.
3. The security device of Claim 2, wherein said at least one magnetic element is supported on said substrate.
4. The security device of any preceding Claim, wherein said at least one
10 magnetic element is responsive to said applied magnetic field to switch the magnetisation or magnetic polarisation of said at least one magnetic element.
5. The security device of any preceding Claim, wherein said at least one magnetic element is made from a material that operates in a sharp switching mode.
6. The security device of any preceding Claim, wherein said at least one magnetic
15 element is made from a magnetically soft material.
7. The security device of Claim 6, wherein said at least one magnetic element comprises a magnetically soft material selected from one or more of: nickel, iron, cobalt and alloys thereof with each other or silicon, such as nickel iron alloy, cobalt iron alloy, iron silicon alloy or cobalt silicon alloy.
- 20 8. The security device of Claim 6 or 7, wherein said magnetically soft material is a permalloy material.
9. The security device of any preceding Claim, wherein said at least one magnetic element is substantially wire-shaped or flattened wire shaped.
10. The security device of any preceding Claim, wherein said at least one magnetic
25 element is backed by a light reflective layer.

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11. The security device of any preceding Claim, wherein said at least one magnetic element is provided proximal a reduced light reflectivity portion of said security device.
12. The security device of any preceding Claim, comprising a plurality of said at
5 least one magnetic elements.
13. The security device of Claim 12, wherein said plurality of magnetic elements is arranged to provide a linear pattern.
14. The security device of Claim 12, wherein said plurality of magnetic elements is arranged to provide a two-dimensional pattern.
- 10 15. The security device of Claim 13 or Claim 14, wherein said pattern encodes an identifier.
16. The security device of any preceding Claim, further comprising a unique identifier incorporated therewith.
17. The security device of claim 16, wherein said unique identifier is provided by
15 way of one or more of: an optically readable bar code; one or more optical indicia; a magnetically encoded identifier; and an electronic identifier.
18. The security device of claim 17, mounted upon a smart-card, wherein said electronic identifier is provided by a smart-card chip provided on said smart-card.
19. The security device of any preceding Claim, wherein premeasured
20 characteristic response information representing one or more measurable parameters of said characteristic response is stored on said security device.
20. The security device of Claim 19, wherein said premeasured characteristic response information is in encrypted form.
21. A method of manufacturing a security device, comprising:
25 providing at least one magnetic element, wherein said at least one magnetic element provides a characteristic response in response to an applied magnetic field.

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22. The method of Claim 20, comprising providing said at least one magnetic element on a substrate.
23. The method of Claim 21 or Claim 22, comprising forming said at least one magnetic element using a lift-off or wet etching process.
- 5 24. The method of Claim 21 or Claim 22, comprising forming said at least one magnetic element using an ion beam etching process.
25. The method of any one of Claims 21 to 24, comprising measuring the magnitude(s) of one or more magnetic parameters of said at least one magnetic element.
- 10 26. The method of Claim 25, comprising measuring one or more of coercivity and jitter values.
27. The method of Claim 25 or Claim 26, comprising using the measured magnitude(s) of said one or more magnetic parameters to represent premeasured characteristic response information.
- 15 28. The method of Claim 27, comprising encrypting said premeasured characteristic response information.
29. The method of Claim 27 or Claim 28, comprising storing said premeasured characteristic response information in encrypted or unencrypted form on said security device.
- 20 30. The method of Claim 27 or Claim 28, comprising storing said premeasured characteristic response information in encrypted or unencrypted form in a storage medium remote from said security device.
31. The method of Claim 30, comprising storing said premeasured characteristic response information in encrypted or unencrypted form in a database.
- 25 32. The method of any one of Claims 21 to 31, further comprising providing said security device with a unique identifier.

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33. The method of Claim 32 when dependant upon any one of Claims 28 to 31, comprising storing a representation of said unique identifier in association with said premeasured characteristic response information.
34. A system for reading a security device, comprising:
- 5 a magnetic field generation system for applying a magnetic field to a security device; and
- a detection system for measuring one or more parameters representative of a measured characteristic response of said security device in response to said magnetic field,
- 10 wherein said system is operable to compare said one or more parameters representative of a measured characteristic response to one or more respective parameters of a premeasured characteristic response to determine whether respective measured and premeasured parameters are substantially equivalent.
35. The system of Claim 34, wherein the magnetic field generation system is
- 15 operable to apply a time varying magnetic field to a security device.
36. The system of Claim 34 or Claim 35, wherein a light beam is used to interrogate said security device.
37. The system of any one of Claims 34 to 36, wherein said light beam is a visible or near-infrared beam produced by a laser diode.
- 20 38. The system of any one of Claims 34 to 37, wherein said parameters represent one or more of coercivity and jitter values.
39. The system of any one of Claims 36 to 38, wherein said detection system incorporates magneto-optic Kerr effect detection apparatus for detecting changes induced in said light beam by magnetic elements of said security device.
- 25 40. The system of Claim 39, wherein said magneto-optic Kerr effect detection apparatus is configured to operate in transverse mode.
41. The system of any one of Claims 36 to 40, further operable to deflect said light beam across the surface of said security device.

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42. The system of any one of Claims 34 to 41, further operable to read a unique identifier from said security device.

43. The system of Claim 42, wherein said unique identifier is identified by recognising a pattern of magnetic elements supported by said security device.

5 44. The system of Claim 42 or 43, wherein said unique identifier is identified by reading one or more of: an optically readable bar code; one or more optical indicia; a magnetically encoded identifier; and an electronic identifier.

45. The system of any one of Claims 34 to 44, further operable to determine said one or more respective parameters of the premeasured characteristic response by
10 reading said one or more parameters from said security device.

46. The system of any one of Claims 34 to 45, further operable to determine said one or more respective parameters of the premeasured characteristic response by reading said one or more parameters from a database.

47. The system of Claim 46, wherein said database is remotely located from said
15 detection system.

48. The system of any one of Claims 34 to 47, further operable to decrypt premeasured characteristic response information where it is read or provided in encrypted form.

49. A method for reading a security device, comprising:
20 applying a magnetic field to a security device;
measuring one or more parameters representative of a measured characteristic response of said security device in response to said magnetic field; and
comparing said one or more parameters representative of a measured characteristic response to one or more respective parameter(s) of a premeasured
25 characteristic response to determine whether respective measured and premeasured parameters are substantially equivalent.

50. The method of Claim 49, comprising applying a time varying magnetic field to a security device.

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51. The method of Claim 49 or Claim 50, wherein measuring of one or more parameters representative of a measured characteristic response of said security device in response to said magnetic field comprises measuring one or more of coercivity and jitter values.
52. The method of any one of Claims 49 to 51, comprising interrogating said security device using a light beam.
53. The method of any one of Claims 49 to 52, comprising operating a laser to produce a visible or near-infrared beam.
- 10 54. The method of Claim 52 or Claim 53, comprising detecting changes induced in said light beam by magnetic elements of said security device using the magneto-optic Kerr effect.
55. The method of Claim 54, comprising using the magneto-optic Kerr effect transverse mode.
- 15 56. The method of any one of Claims 52 to 55, comprising deflecting said light beam across the surface of said security device.
57. The method of any one of Claims 49 to 56, comprising reading a unique identifier from said security device.
58. The method of Claim 57, comprising identifying said unique identifier by recognising a pattern of magnetic elements supported by said security device.
- 20 59. The method of Claim 57 or 58, comprising identifying said unique identifier by reading one or more of: an optically readable bar code; one or more optical indicia; a magnetically encoded identifier; and an electronic identifier.
60. The method of any one of Claims 49 to 59, comprising determining said respective one or more parameters of the premeasured characteristic response by reading said one or more parameters from said security device.
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61. The method of any one of Claims 49 to 60, comprising determining said one or more respective parameters of the premeasured characteristic response by reading said one or more parameters from a database.

5 62. The method of Claim 61, comprising accessing a database remotely located from said detection system.

63. The method of any one of Claims 49 to 62, further comprising decrypting premeasured characteristic response information where it is read or provided in encrypted form.

64. A product comprising the security device of any one of Claims 1 to 20.

10 65. The product of Claim 64, comprising one or more of: a document; a passport; an identity card; a compact disc; a digital versatile disc; a software product; packaging; an item of clothing; an item of footwear; a smart-card; a credit or bank card; a cosmetic item; an engineering part; an accessory; and any other goods and/or items of commerce, whether manufactured or otherwise.

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